

Math 1050 – Exam 4 Review

1. Graph the equation: $(x-2)^2 + y^2 = 9$.
2. Find the equation of a circle in standard form where $C(2, -5)$ and $D(6, 1)$ are endpoints of a diameter.
3. Find the center (h, k) and the radius r of the circle with the given equation: $x^2 + y^2 - 10x + 6y - 2 = 0$.
4. Find the equation of the parabola with focus at $(1, -1)$ and directrix the line $y = 3$.
5. Find the vertex, focus, and directrix of the parabola. Graph the equation. $(y-4)^2 = 8(x+2)$.
6. Graph the ellipse and locate the foci: $9x^2 + 4y^2 = 36$.
7. Find the center, foci, and vertices of the ellipse with the equation $\frac{(x+1)^2}{4} + \frac{(y-2)^2}{9} = 1$.
8. A hall 100 feet in length was designed as a whispering gallery. If the ceiling is 20 feet high at the center, how far from the center are the foci located?
9. Graph the hyperbola: $16y^2 - 9x^2 = 144$.
10. Find the center, transverse axis, vertices, foci and asymptotes of the hyperbola with equation $\frac{(y+2)^2}{4} - \frac{(x-3)^2}{9} = 1$.
11. Find the equation for the hyperbola with center $(2, 3)$, focus $(0, 3)$, and vertex $(1, 3)$.
12. Write the augmented matrix for the system
$$\begin{cases} 4x - 3y + z = -2 \\ 5y - z = 6 \\ 2x + 8z = -9 \end{cases}$$
.

For questions 13-15, state whether the system of equations corresponding to the given matrix is consistent or inconsistent, state how many solutions it has, and give the solution set.

13.
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & 1 \end{array} \right]$$

14.
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 0 & 1 \end{array} \right]$$

15.
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -2 \\ 0 & 1 & 3 & 4 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

16. Perform the requested row operation on the matrix
$$\left[\begin{array}{ccc|c} 2 & 4 & 5 & -2 \\ 1 & 2 & 3 & 4 \\ 3 & 3 & 7 & 1 \end{array} \right]$$
. $R_2 = -3r_2 + r_3$.

17. Solve for x : $\begin{vmatrix} 2 & -5 \\ 4 & x \end{vmatrix} = 6$.

18. Find the value of the determinant by hand: $\begin{vmatrix} -1 & 2 & 1 \\ 2 & -2 & 3 \\ 3 & -1 & 0 \end{vmatrix}$.

19. Solve the system of equations using Cramer's Rule, if it is applicable. You may find the value of the determinants on your calculator, but write down the determinants you are evaluating:
$$\begin{cases} 2x - y + z = 3 \\ x - y - z = 4 \\ x + 2y - 2z = 1 \end{cases}$$

Use the following matrices to answer questions 20 and 21: $A = \begin{bmatrix} 2 & 1 \\ 4 & -3 \end{bmatrix}$. $B = \begin{bmatrix} -3 & 4 \\ -2 & 7 \end{bmatrix}$.

20. Find $A + B$.

21. Find $3A - 2B$.

22. Compute the product: $\begin{bmatrix} 1 & 2 & 3 \\ 0 & -1 & 4 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ -1 & 0 \\ 2 & 4 \end{bmatrix}$

23. Find the inverse of the matrix by hand using row operations: $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$.

24. Solve the system using the inverse matrix method:
$$\begin{cases} x + 2y + 3z = 2 \\ x + y + z = -3 \\ -x + y + 2z = 4 \end{cases}$$

The inverse of $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 1 \\ -1 & 1 & 2 \end{bmatrix}$ is $\begin{bmatrix} 1 & -1 & -1 \\ -3 & 5 & 2 \\ 2 & -3 & -1 \end{bmatrix}$.

For questions 25-27, find the partial fraction decomposition.

25. $\frac{x}{x^2 + 7x + 12}$

26. $\frac{3x^2 - 2x + 4}{(x+1)(x-1)^2}$

27. $\frac{2x+1}{(x+1)(x^2+x+1)}$